

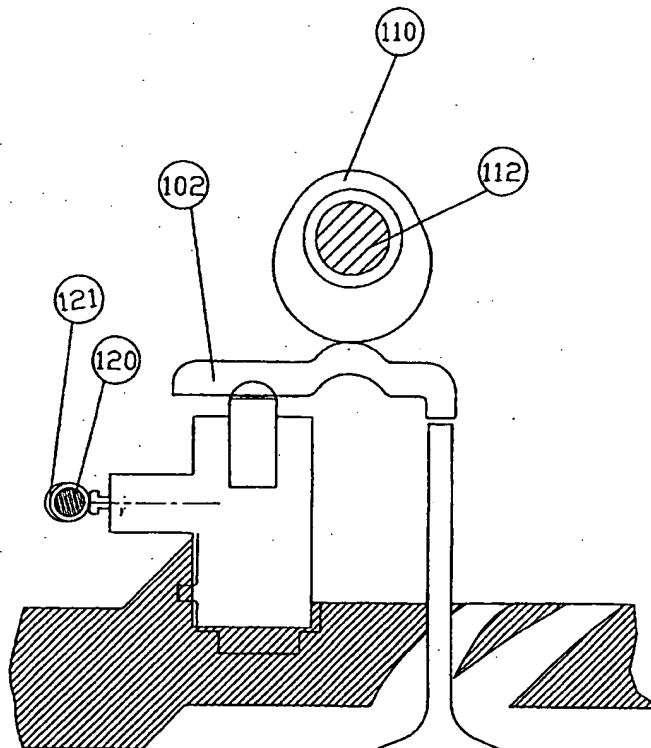
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification 5 :</b> <b>F01L 1/28, 9/02</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 94/28288</b> <b>(43) International Publication Date:</b> 8 December 1994 (08.12.94)
<b>(21) International Application Number:</b> PCT/US94/05635 <b>(22) International Filing Date:</b> 23 May 1994 (23.05.94) <b>(30) Priority Data:</b> 08/066,350 24 May 1993 (24.05.93) US <b>(71) Applicant (for AU only):</b> HUSSAINI, Syed, A. [US/US]; Source Graphics, 1526 W. Dogwood Avenue, Anaheim, CA 92801 (US). <b>(71)(72) Applicant and Inventor:</b> SYED, Ahmed [PK/PK]; 801 N. Loara Street, #52, Anaheim, CA 92801 (US). <b>(74) Common Representative:</b> HUSSAINI, Syed, A.; 1526 W. Dogwood Avenue, Anaheim, CA 92801 (US).	<b>(81) Designated States:</b> AU, CN, JP, KR, RU, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <b>(88) Date of publication of the international search report:</b> 23 February 1995 (23.02.95)	

**(54) Title:** VARIABLE VALVE TIMING SYSTEM**(57) Abstract**

A valve control arrangement for internal combustion engines in which a hydraulic valve actuator with integral fluid reservoir is interactive with two camshafts (110, 120) to continuously and independently vary the valve duration. A modified intake system is provided to increase the effective area of the valves.



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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 94/05635

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 5 F01L1/28 F01L9/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 F01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 9, no. 202 (M-405) (1925) 20 August 1985 & JP,A,60 065 214 (MITSUBISHI) 15 April 1985 see abstract ---	1-3
X	US,A,2 105 699 (PATE) 18 January 1938 see page 1, line 10 - line 34 see figure 1 ---	1,2
X	FR,A,817 159 (CHEVALIER) 27 August 1937 see page 1, line 1 - line 55 see figure 1 ---	1,2
A	US,A,4 696 265 (NOHIRA) 29 September 1987 ---	
A	GB,A,2 070 716 (PORSCHE) 9 September 1981 ---	
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

8 September 1994

Date of mailing of the international search report

17.01.95

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# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 94/05635

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 615 307 (KODAMA) 7 October 1986 cited in the application ---	
A	DE,A,30 48 887 (AUDI) 22 July 1982 -----	

# INTERNATIONAL SEARCH REPORT

I. national application No.

PCT/US 94/05635

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see annex

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

claims 1-3

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

1. Claims: 1-3      mono-valve type engine
2. Claims: 4-6      variable timing system
3. Claims: 7-9      hydraulic engine valve timing system
4. Claims: 10-15    hydraulic valve actuator

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 94/05635

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-2105699		NONE	
FR-A-817159		NONE	
US-A-4696265	29-09-87	JP-B- 6012058 JP-A- 61155608	16-02-94 15-07-86
GB-A-2070716	09-09-81	DE-A- 3004396 FR-A, B 2475622 JP-A- 56126609 SE-B- 442535 SE-A- 8100695 US-A- 4452186	13-08-81 14-08-81 03-10-81 13-01-86 08-08-81 05-06-84
US-A-4615307	07-10-86	JP-C- 1623069 JP-B- 2047564 JP-A- 60204912	25-10-91 22-10-90 16-10-85
DE-A-3048887	22-07-82	NONE	